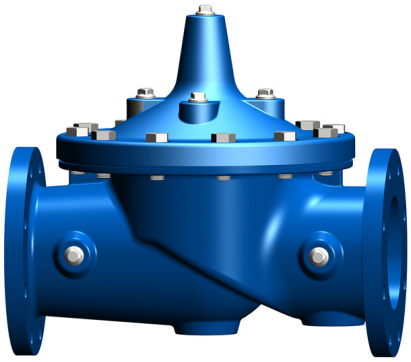
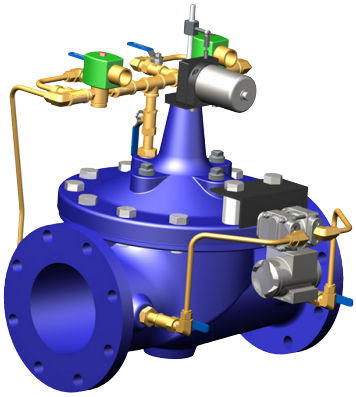
Cla-Val

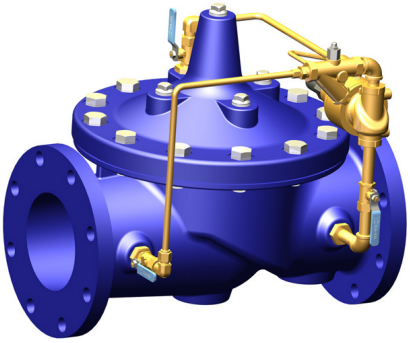
Service Training Manual

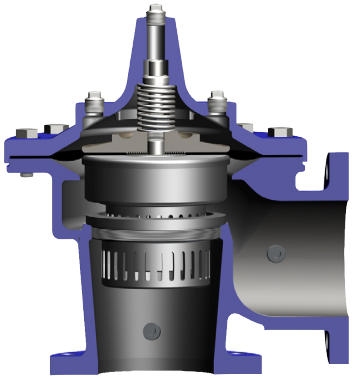
Section # 4

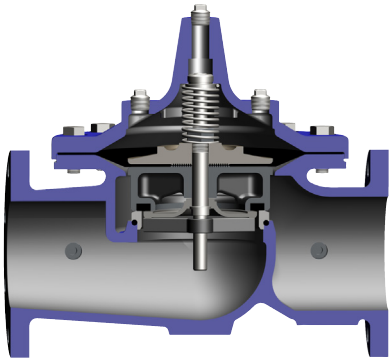
Startup and Adjustments

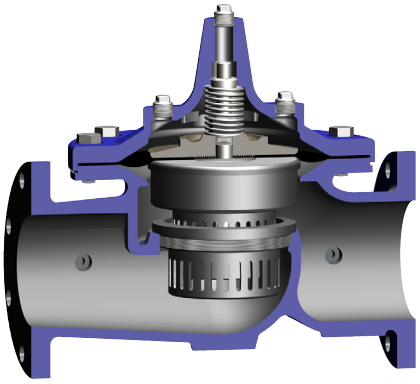






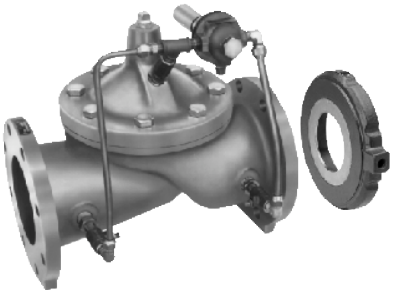






“Simple solutions plus learning with a purpose”

Section 4



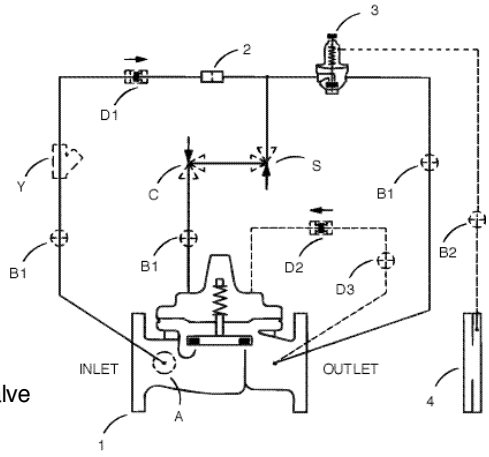
40-01/640-01 Rate of Flow Control

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restricting Fitting
3	CDHS18 Differential Control
4	X52E Orifice Plate Assembly

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation valve
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



Rate of Flow Start-up and Adjustment Instructions 40-01/640-01

1. Install pressure gauges at main valve inlet/outlet. Place gauges in unused body tappings. Downstream gauge can be installed in unused 3/8" CDHS-18 Differential Control (item # 3) body tapping. In addition a flow meter is required to set the rate of flow through the valve.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Make sure low pressure sensing line (not supplied by Cla-Val) is connected to the low pressure sensing port on the X52A-1 Orifice Plate Assembly (item # 4) from cover of CDHS-18 Differential Control (item # 3). Orifice plate assembly should be 1-5 pipe diameters downstream of main valve.

4. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

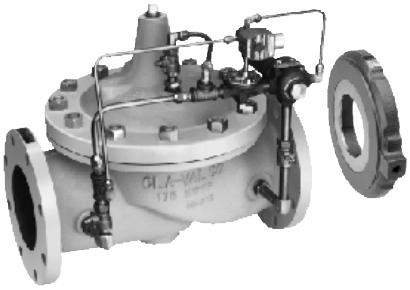
6. Open inlet isolation valve slowly to pressurize main valve.

7. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installation to valves 6" and smaller). Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open downstream isolation valve and establish a flow in the system.

9. Slowly adjust the CDHS-18 Differential Control (item # 3) observing the flow rate via the meter until the desired flow rate is achieved (clockwise to increase setting or counter-clockwise to decrease setting). Adjust CV flow controls until desired valve opening or closing speeds are obtained. Adjust opening rate so that valve opens slowly to desired flow rate and does not over shoot setting. Adjust closing rate so valve does not cause excessive system pressure surging upon closing.

10. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.



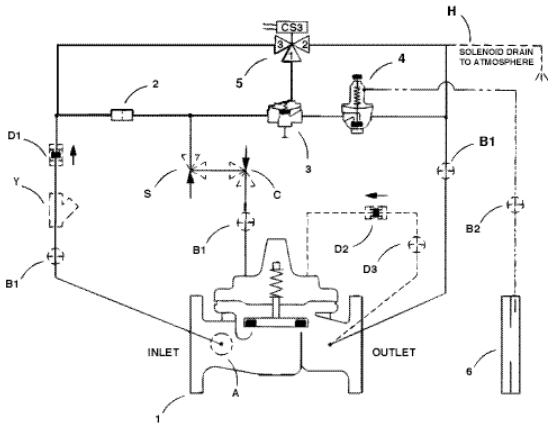
43-01/643-01 Combination Rate of Flow Controller & Solenoid Shut-off Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restriction Fitting
3	100-01 Hytrol (Reverse Flow)
4	CDHS18 Differential Control
5	CS3 Solenoid Control
6	X52E Orifice Plate Assembly

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation valve
H	Solenoid Drain to Atmosphere
S	CV Flow Control (Opening)
Y	X43 “Y” Strainer



1. Install pressure gauges at main valve inlet/outlet. Place gauges in unused body tappings. Downstream gauge can be installed in the unused 3/8" CDHS-18 Differential Control (item # 3) body tapping. In addition a flow meter is require to set the rate of flow through the valve.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Make sure low pressure sensing line (not supplied by Cla-Val) is connected to the low pressure sensing port on the X52A-1 Orifice Plate Assembly (item # 6) from the cover of the CDHS-18 Differential Control (item # 4). Orifice plate assembly should be 1-5 pipe diameters downstream of main valve.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

6. Locate the CS3 Solenoid Control (item # 5) in the pilot system. Make sure proper voltage is supplied to the coil. If the unit is equipped with a manual operator make sure it is backed all the way out counter-clockwise (rotating the red thumb screw clockwise simulates energization of the coil). Solenoid can be supplied energized to open main valve or de-energized to open main valve. You can determine the valve operation in two ways:

A. Energized to open main valve supply pressure comes to port # 3 on CS3 solenoid (item #5), port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item # 3), and port # 2 is vented to atmosphere (catalog number suffix H) or to the downstream side of the valve standard. Also check the Asco Solenoid catalog number 8320G136 normally open.

B. De-energized to open main valve supply pressure comes to port # 2 on CS3 solenoid (item # 5), port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item # 3), and port # 3 is vented to atmosphere (catalog number suffix H) or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G132 normally closed.

7. Open inlet isolation valve slowly to pressurize main valve.

8. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installation to valves 6" and smaller). Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

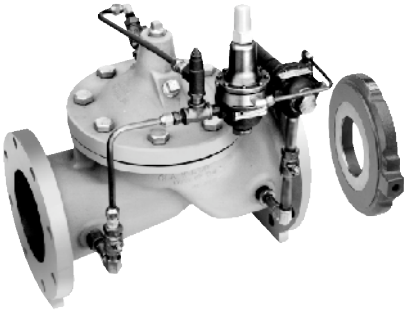
9. Open downstream isolation valve and establish a flow in the system. To accomplish this the CS3 solenoid (item #5) must be electrically energized to open the main valve under command of the CDHS-18 Differential Control (item # 4) in valves so equipped. If the valve is de-energized to open no electrical power is required to open the main valve. In valves so equipped if the CS3 solenoid (item #5) is energized the main valve closes. The porting sequence for the CS3 solenoid (energized to open or de-energized to open) appears in the valve schematic. Always check the effect in the system before starting.

10. Slowly adjust the CDHS-18 Differential Control observing the flow rate via the meter until the desired flow rate is achieved (clockwise to increase setting or counter-clockwise to decrease setting). Adjust CV flow controls until the desired valve opening or closing speeds are obtained. Adjust the opening rate so that valve opens slowly to the desired flow rate and does not over shoot the setting. Adjust closing rate so the valve does not cause excessive system surging upon closing.

11. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

12. To close the main valve on solenoids energized to open remove electrical power from the solenoid. This will connect ports 3 & 1 on the solenoid directing inlet pressure into the cover of the 3/8" auxiliary hytrol closing it. This will in turn direct inlet pressure into the cover of the main valve closing it.

13. To close the main valve on solenoids de-energized to open apply electrical power to the solenoid. This will connect ports 2 & 1 on the solenoid directing inlet pressure into the cover of the 3/8" auxiliary hytrol closing it. This will in turn direct inlet pressure into the cover of the main valve closing it.



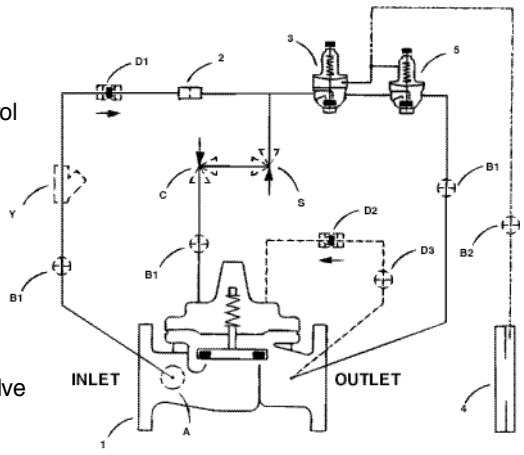
49-01/649-01 Combination Rate of Flow & Pressure Reducing Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58A Restriction Fitting
3	CRA Pressure Reducing Control
4	X52E Orifice Plate Assembly
5	CDHS18 Differential Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation valve
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet/outlet. Place gauges in unused body tappings. Downstream gauge can be installed in unused 3/8" CDHS-18 Differential Control (item # 3) body tapping. In addition a flow meter is required to set the rate of flow through the valve.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Observe the setting on the CRA Pressure Reducing Control (item #3). There is a tag attached to the pilot cover with the factory setting. If the pilot has a 15-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 30-300 PSI spring range has a 27 PSI change for each 360 degree turn in/out. Alter the factory setting (turn adjustment clockwise/counter-clockwise) until the set point of the control is close to the required setting. This setting is approximate and may have to be changed once the valve is pressurized. Actual pressure settings must be made under a flowing condition.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

6. Make sure low pressure sensing line (not supplied by Cla-Val) is connected to the low pressure sensing port on the X52A-1 Orifice Plate Assembly (item # 4) from the cover of the CDHS-18 Differential Control (item # 5). Orifice plate assembly should be 1-5 pipe diameters downstream of main valve.

7. Open inlet isolation valve slowly to pressurize main valve.

8. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installation to valves 6" and smaller.) Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

9. Open downstream isolation valve and establish a low flow in the system. Refer to minimum flow requirements for each valve size to set CRA Pressure Reducing Control. Always check the effect in the system before starting.

Size	Minimum Flow (gpm)
1 1/4-1 1/2"	15
2"	15
2 1/2"	20
3"	30
4"	50
6"	115
8"	200
10"	300
12"	400
14"	500
16"	650
24"	1500

10. Slowly adjust the CRA Pressure Reducing Control (item #3) observing the down stream pressure gauge until the desired pressure is achieved (clockwise to increase setting or counter-clockwise to decrease setting). Adjust CV flow controls until desired valve opening or closing speeds are obtained. Adjust opening rate so that valve opens slowly to desired outlet pressure and does not over shoot setting. Adjust closing rate so valve does not cause excessive system pressure surging upon closing.

11. Next adjust CDHS-18 Differential Control until desired flow rate is achieved. Observe flow meter during adjustment (clockwise to increase flow rate and counter-clockwise to decrease flow rate). The adjustment range on the control is 30-480 inches of water. This is the only spring range supplied for this pilot. In most cases the orifice bore supplied in the orifice plate assembly is sized to produce a minimum of 100 inches of differential at the rated flow.

12. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

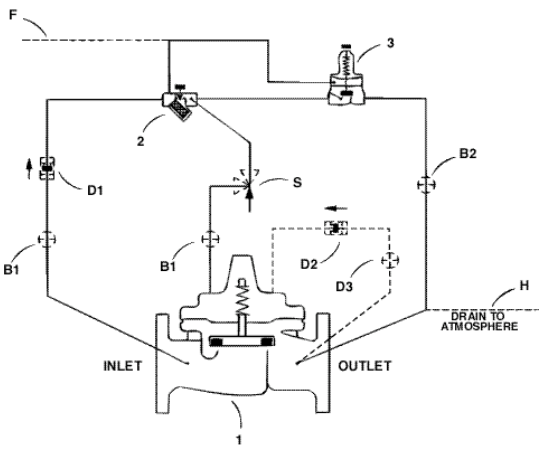
50-01/650-01 Pressure Relief, Pressure Sustaining Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X42N-2 Strainer & Needle Valve
3	CRL Pressure Relief Control

Optional Features

Item	Description
B	CK2 Isolation Valve
D	Check Valves with Isolation valve
F	Remote Pilot Sensing
H	Drain to Atmosphere
S	CV Speed Control (Opening)



1. Install pressure gauge at main valve inlet. Place gauge in unused inlet body tapping.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (If available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Adjust needle valve in X42N-2 (Item # 2). Open needle valve 1/4 turn to start. Do not close needle valve all the way or main valve will not close. The needle valve may require further adjustment depending on valve size.

5. Close the CRL Pressure Relief Control (Item # 3) all the way by turning the adjustment clockwise. Observe the setting on the control. There is a tag attached to the pilot cover with the factory setting. If the pilot has a 0-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 20-200 PSI spring range has a 27 PSI change for each 360 degree turn in/out. Increase the factory setting (turn adjustment clockwise) until the set point of the control is at least 20 PSI above the normal system operating pressure. This setting is approximate and may have to be increased once the valve is pressurized.

6. Open inlet isolation valve slowly to pressurize main valve. If relief valve begins to open adjust CRL Pressure Relief Control clockwise until valve closes.

7. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve Position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed. It may be necessary to loosen several screws on the cover of the CRL Pressure Relief Control (item # 3) to completely exhaust air from the control. This depends on the orientation of the control in the pilot system.

8. Raise normal system operating pressure 10 PSI under a flowing condition. Always check the effect in the system before starting. Slowly adjust the CRL Pressure Relief Control (item # 3) counter-clockwise to allow the main valve to just begin to open then stop. turn CRL adjustment clockwise until main valve closes . Lower system pressure to its normal flowing setting. Pressure relief valve is now set approximately 10 PSI above normal operating pressure. Using the above procedure the relief valve can be set at any pressure above normal system operating pressure.

9. Raise the system pressure to test the relief valve set point and opening speed. The relief valve is designed to open quickly and close slowly. If the o pening speed requires adjustment change setting on needle valve of X42N-2. Turn needle valve clockwise to increase opening speed response and counter-clockwise to decrease opening speed response.

10. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

Note: The 50-01/650-01 Pressure Relief Valve can also be used as a pressure sustaining or back pressure control valve. There are no modifications required to the main valve or pilot control system to use this valve in a pressure sustaining or back pressure application. However the adjustment procedure is different. Refer to items 1,2,&3 to start the adjustment procedure.

Then:
11. Adjust needle valve in X42n-2 (item # 2). Open needle valve 1/2 turn to start. Do not close needle valve all the way or main valve will not close. The needle valve may require further adjustment depending on valve size.

12. Observe the setting on the CRL Pressure Relief Control (item # 3). There is a tag attached to the pilot cover with the factory setting. If the pilot has a 15-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 20-200 PSI spring range has a 27 PSI change for each 360 degree turn in/out. Using this information adjust the pilot control setting to the desired back pressure. This setting is approximate and may have to be changed under a flowing condition.

13. Open inlet isolation valve slowly to pressurize main valve.

14. Bleed air from main valve cover by loosening the pipe plug in the center of the main valve cover or X101 Valve Position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from the main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points to remove air from the pilot control system. Tighten tube nuts after all air is removed. It may be necessary to loosen several screws on the cover of CRL Pressure Relief Control (item # 3) to completely exhaust air from the control. This depends on the orientation of the control in the pilot system.

15. Open the down stream isolation valve and establish a flow in the system. Always check the effect in the system before starting.

16. Slowly adjust the CRL Pressure Relief Control (item #3) observing the inlet pressure gauge until the desired back pressure is achieved.

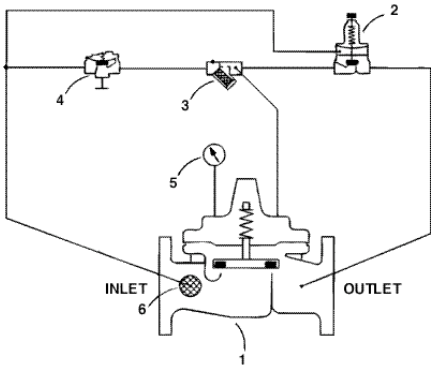
17. All valve adjustments are now set. Lock up all jam nuts to retain settings. Replace all pilot caps.

Note: The 50-01/650-01 control valve uses the X42N-2 Strainer and Needle Valve Assembly. The strainer screen in this assembly has a small surface area. This screen can clog up quickly especially on the start up of a new system. When the screen clogs up the valve malfunctions due to loss of the supply pressure to the pilot control system. Check the screen periodically.

50B-4KG-1/2050B-4KG-1
Fire Pump Relief Valve

Schematic Diagram

Item	Description
1	100-06 Hytrol (Main Valve)
2	CRL Pressure Relief Control
3	X44A Strainer & Orifice Assembly
4	81-01 Check Valve
5	Pressure Gauge
6	X46A Flow Clean Strainer



1. Install pressure gauge at main valve inlet. Place gauge in unused inlet body tapping of main valve.

2. Install X101C Valve Position Indicator in center cover tapping of main valve (If available).

3. Remove pilot cap and loosen jam nut on CRL Pressure Relief Control (item # 2).

4. Observe the setting on the control. There is a tag attached to the pilot cover with the factory setting. The 20-200 PSI spring range has a 28 PSI change for each 360 degree turn in/out. The 100-300 PSI spring range has an 18 PSI change for each 360 degree turn in/out. Change the factory setting (turn adjustment clockwise to increase setting or counter-clockwise to decrease setting) until the required set point of the control is obtained. This setting is approximate and the final pilot control setting must be made under a flowing condition.

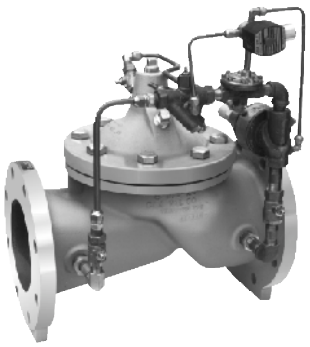
5. On centrifical pump systems, open an isolation valve in the system and slowly pressurize the valve using the pump suction pressure only. For vertical turbine pump systems the pump must be started to supply pressure to the relief valve.

6. Bleed air from main valve cover by loosening the pipe plug in the center of main valve cover or the bushing gland on the X101C Valve Position Indicator. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug, cover bolts, or bushing gland after all air is removed. **Caution:** only loosen pipe plug, cover bolts or bushing gland enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed. It may be necessary to loosen several screws on the cover of the CRL Pressure Relief Control (item # 2) to completely exhaust air from the control. This depends on the orientation of the control in the pilot system. Please note that for vertical turbine pump systems the air bleeding procedure can only be performed when the pump is running and there is flow through the valve. Always check the effect in the system before starting.

7. Start the pump and observe the flow through the valve with the system sight cone and X101C valve position indicator. On vertical turbine pump systems perform the air bleeding procedure at this time before adjusting the pilot control. Adjust the relief valve inlet pressure by changing the setting on the CRL Pressure Relief Control (item # 2) and observing the inlet pressure gauge. Make setting changes slowly. Turn the adjustment clockwise to increase the inlet pressure and counter-clockwise to decrease the inlet pressure. The 50B-4KG-1 Fire Pump Relief Valve is designed to open quickly and close slowly. The valve pilot control system includes a check valve (item # 4) and a pressure gauge in the valve cover (item # 5). When cover p r essure is higher then inlet pressure, the check valve (item # 4) closes. This maintains the higher pressure in the main valve cover chamber keeping the main valve closed. The cover pressure gauge (item # 5) should always indicate a positive pressure even when the valve is closed.

8. The valve adjustment is now set. Lockup the jam nut on the CRL Pressure Relief Control (item # 2)to retain the setting and replace the pilot cap. Turn off the pump after the initial test is complete.

Note: Periodic cleaning of the strainer screen in the X44A Strainer & Orifice assembly (item #3) is recommended.



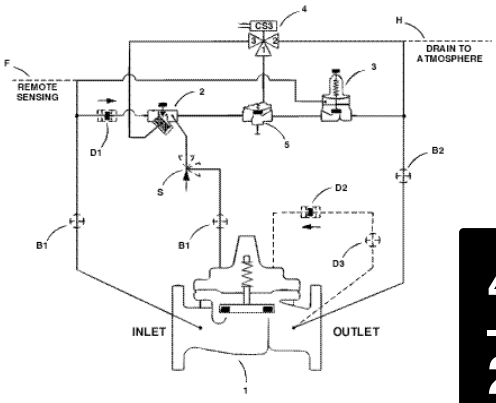
58-01/658-01 Combination Back Pressure & Solenoid Shut-off Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X42N-3 Strainer & Needle Valve
3	CRL Pressure Relief Control
4	CS3 Solenoid Control
5	100-01 Hytrol (Reverse Flow)

Optional Features

Item	Description
B	Shutoff Isolates Pilot System
D	Check Valves with Isolation valve
F	Remote Pilot Sensing
H	Drain to Atmosphere
S	CV Speed Control (Opening)



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1. Install pressure gauges at main valve inlet/outlet. Place gauges in unused body tappings.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Observe the setting on the CRL Pressure Relief Control (item # 3). There is a tag attached to the pilot cover with the factory setting. If the pilot has a 0-75 PSI spring range each 360 degree turn in/out changes the setting 8.5 PSI. The 20-200 PSI spring range has a 28 PSI change for each 360 degree turn in/out. Alter the factory setting (turn adjustment clockwise/counter-clockwise) until the set point of the control is close to the required se t t i n g . This setting is approximate and may have to be changed once the valve is pressurized. Actual pressure settings must be made under a flowing condition.

5. Adjust CV flow control (opening speed) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

6. Adjust X42N-3 Needle Valve and Strainer Assembly (item # 2). Loosen jam nut and close needle valve all the way clockwise. Then back out 1/2 turn to start. Needle valve may require further adjustment depending on valve size.

7. Locate the CS3 Solenoid Control (item # 4) in the pilot system. Make sure proper voltage is supplied to the coil. If the unit is equipped with a manual operator make sure it is backed all the way out counter-clockwise (rotating the red thumb screw clockwise simulates energization of the coil.) Solenoid can be supplied energized to open main valve or de-energized to open main valve. You can determine the valve operation in two ways:
A) Energized to open main valve supply pressure comes to port # 3 on solenoid, port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item # 5), and port # 2 is vented to atmosphere (catalog number suffix H. or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G136 normally open.

B. De-energized to open main valve supply pressure comes to port # 2 on CS3 solenoid (item # 5), port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item # 5), and port # 3 is vented to atmosphere (catalog number suffix H) or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G132 normally closed.

8. Open inlet isolation valve slowly to pressurize main valve.

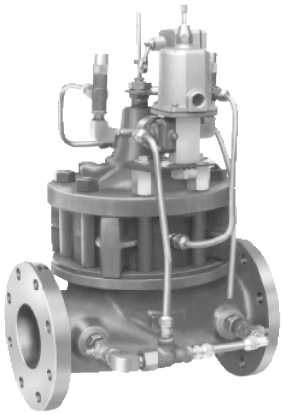
9. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installations of valves to 6" and smaller). Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

10. Open downstream isolation valve and establish a low flow in the system. To accomplish this the CS3 solenoid (item # 5) must be electrically energized to open the main valve under command of the CRL Pressure Relief Control (item #3) in valves so equipped. If the valve is de-energized to open no electrical power is required to open the main valve. In valves so equipped if the CS3 solenoid (item #4) is energized the main valve closes.The porting sequence for the CS3 solenoid (energized to open or de-energized to open appears in the valve schematic) Refer to minimum flow requirements for each valve size. Always check the effect in the system before starting.

11. All valve adjustments are now set. Lock all jam nuts to retain settings. Replace all pilot caps.

12. To close the main valve on solenoids energized to open remove electrical power from the solenoid. This will connect ports 3 & 1 on the solenoid directing inlet pressure into the cover of the main valve closing it.
To close the main valve on solenoid de-energized to open apply electrical power to the solenoid.
This will connect ports 2 & 1 on the solenoid directing inlet pressure into the cover of the 3/8" auxilliary hytrol (item #5) closing it. This will inturn direct inlet pressure into the cover of the main valve closing it.

Refer to valve schematic for location of pilot controls.



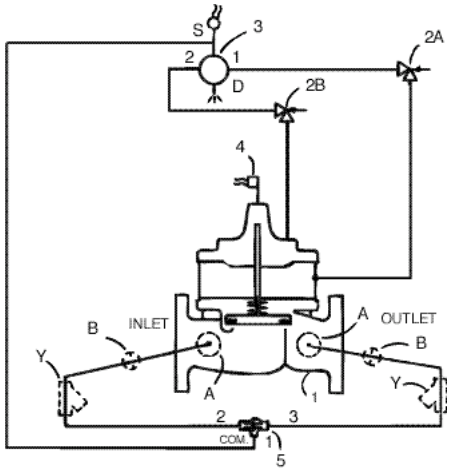
60-11/660-11 Booster Pump Control Valve

Schematic Diagram

Item	Description
1	Powercheck (Main Valve)
2	CV Flow Control
3	CSM11-A2-2 Solenoid Control
4	X105LCW Switch Assembly
5	CVS-1 Shuttle Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet/outlet using main valve body tappings.

2. Open all isolation valves in pilot system (valves 4" and larger).

3. Adjust CV Flow Controls (opening speed item 2B/closing speed item 2A) in pilot system. Turn control clockwise until closed then back out three turns to start.

4. Adjust X105 Micro Switch (item # 4) collar on actuating stem. Loosen collar set screws and slide collar along stem until it contacts micro switch arm roller. Slide collar to push back micro switch arm to open switch. You will hear a click indicating the switch is open. Tighten set screws in collar at this point.

5. Locate the CSM-11 Solenoid Control (item #3) in the pilot system. Make sure proper voltage is supplied to the coil. Make sure the plunger style manual operator is not engaged. Rotate the plunger clockwise and push down at the same time to activate the manual operator feature. This simulates energization of the coil. The manual operator will lock in this position. Rotate the manual operator counter-clockwise and the spring load in the coil will return the plunger to its original or “up" position.

6. Open outlet isolation valve slowly to pressurize the main valve.

7. Bleed air from main valve cover by loosening packing gland nut on the X105 Micro Switch Assembly. (item # 4) Tighten packing gland nut after all air is removed. **Caution:** only loosen packing gland nut enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open upstream isolation valve and start the pump to establish a flow and open the valve. To accomplish this the CSM-11 solenoid (item # 3) must be electrically energized to open the valve. As the valve opens the collar on the actuating stem of the micro switch (item #4) travels upward, away from the micro switch arm. This closes the micro switch and locks the pump starter circuit on line. Always check the effect in the system before starting.

9. Observe the opening rate of the valve and adjust the CV opening speed control (item # 2B) to prevent the pump starting surge from being transmitted into the system. Turning the adjustment clockwise decreases the valve opening speed. Turning the adjustment counter-clockwise increases the valve opening speed.

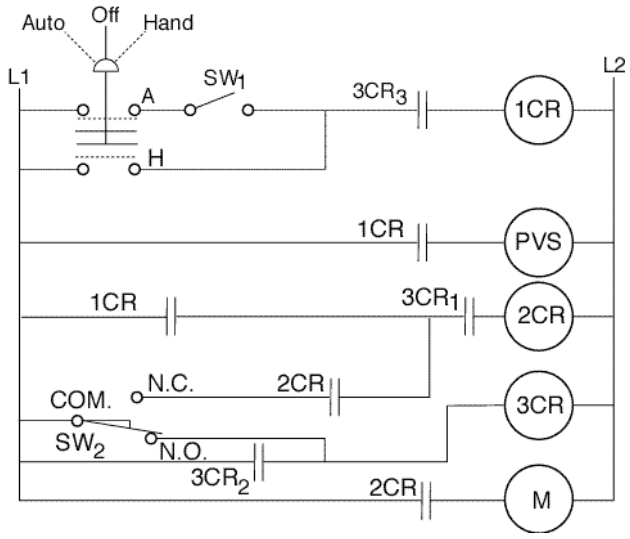
10. Engage the pump stopping sequence. The pump should continue to run and the CSM-11 solenoid (item# 3) should de-energize. This initiates the closing cycle of he valve. Observe the closing rate of the valve and adjust the CV closing speed control (item # 2A.) to prevent the pump stopping surge from being transmitted into the system. Turning the adjustment clockwise decreases the closing rate. Turning the adjustment counter-clockwise increases the closing rate. As the valve closes the actuating stem collar moves toward the micro switch (item # 4) opening it and stopping the pump.
11. All valve adjustments are now set. Lockup all jam nuts to retain settings.
Refer to the valve schematic for location of pilot controls.

Suitable for 60 & 61 Series Valves

Wiring Diagram

Auto-Off-Hand	=	Selector Switch
1CR	=	Relay, DPST Normally Open
2CR	=	Relay, DPST Normally Open
3CR	=	Relay, TPST Normally Open
SW_1	=	Switch, Remote Start,Automatic
SW_2	=	Switch, SPDT, Valve Limit Switch Connect to N.C. Terminal
PVS	=	Pilot Valve Solenoid
M	=	Pump Motor Starter

Note: SW_2 and PVS supplied by Cla-Val. All other electrical items supplied by customer. SW_2 is included in the X105L switch assembly which is mounted on the pump control valve cover.

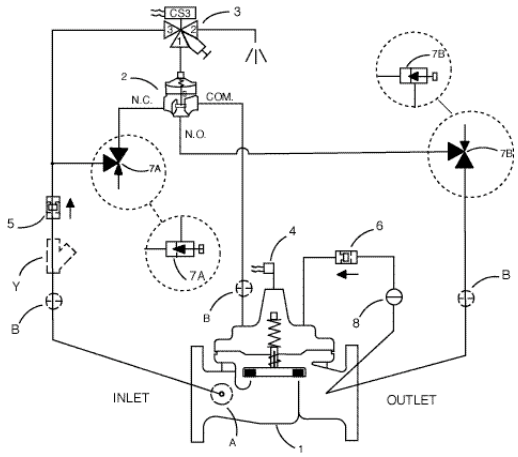


60-31/660-31 Booster Pump Control Valve

Schematic Diagram

Item	Description
1	Hycheck (Main Valve)
2	102C-3H Three Way Hytrol
3	CS3SM Solenoid Control
4	X105LCW Switch Assembly
5	CDC Disk Check Valve
6	CDC/CSC Check Valve
7	CNA Angle Valve
8	CK2 Isolation Valve

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet/outlet using main valve body tappings.
2. Open all isolation valves in pilot system.

3. Adjust CNA Angle valve (opening speed item # 7B/closing speed item # 7A) in pilot system. Turn control clockwise until closed then back out three turns to start. Do not leave these controls closed all the way or the valve will not open or close.

4. Adjust X105 Micro Switch (item # 4) collar on actuating stem. Loosen collar set screws and slide collar along stem until it contacts micro switch arm roller. Slide c ollar to push back micro switch arm to open switch. You will hear a click indicating the switch is open. Tighten set screws in collar at this point.

5. Locate the CS3SM Solenoid Control (item # 3) in the pilot system. Make sure proper voltage is supplied to the coil. Make sure the manual operator is not engaged. Rotate the red thumb screw all the way out counter-clockwise to disengage the manual operator feature. Rotating the red thumb screw clockwise simulates energization of the coil.

6. Open outlet isolation valve slowly to pressurize the main valve.

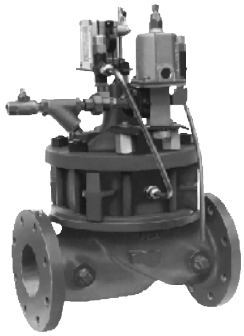
7. Bleed air from main valve cover by loosening packing gland nut on the X105 Micro Switch Assembly. (item # 4) Tighten packing gland nut after all air is removed. **Caution:** only loosen packing gland nut enough to allow the air trapped in the cover to es c a p e . Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open upstream isolation valve and start the pump to establish a flow and open the valve. To accomplish this the CS3SM solenoid (item # 3) must be electrically energized to open the valve. As the valve opens the collar on the actuating stem of the micro switch (item #4) travels upward, away from the micro switch arm. This closes the micro switch and locks the pump starter circuit on line. Always check the effect in the system before starting.

9. Observe the opening rate of the valve and adjust the CNA angle valve opening speed control (item # 7B) to prevent the pump starting surge from being transmitted into the system. Turning the adjustment clockwise decreases the valve opening speed. Turning the adjustment counter-clockwise increases the valve opening speed.

10. Engage the pump stopping sequence. The pump should continue to run and the CS3SM solenoid (item# 3) should de-energize. This initiates the closing cycle of he valve. Observe the closing rate of the valve and adjust the CNA angle valve closing speed control (item # 7A) to prevent the pump stopping surge from being transmitted into the system. Turning the adjustment clockwise decreases the closing rate. Turning the adjustment counter-clockwise increases the closing rate. As the valve closes the actuating stem collar moves toward the micro switch (item # 4) opening it and stopping the pump.

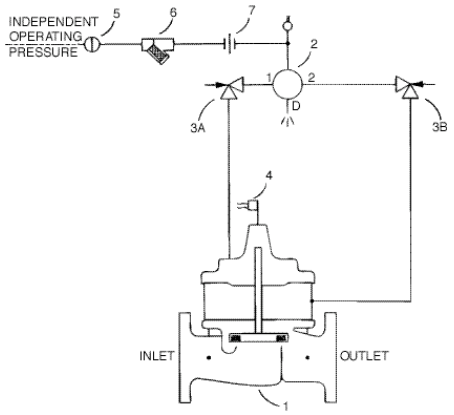
11. All valve adjustments are now set. Lockup all jam nuts to retain settings.



61-02/661-02 Pump Control Valve

Schematic Diagram

Item	Description
1	Powertrol (Main Valve)
2	CSM11-A2-2 Solenoid Control
3	CV Flow Control
4	X105LOW Switch Assembly
5	CK2 Isolation Valve
6	X43 "Y" Strainer
7	Union



1. Install pressure gauge at main valve inlet using main valve body tapping.

2. Open isolation valve in pilot system.

3. Adjust CV Flow Controls (opening speed item 3A/closing speed item 3B) in pilot system. Turn control clockwise until closed then back out three turns to start.

4. Adjust X105 Micro Switch (item # 4) collar on actuating stem. Loosen collar set screws and slide collar along stem until it contacts micro switch arm roller. Slide collar to push back micro switch arm to open switch. You will hear a click indicating the switch is open. Tighten set screws in collar at this point.

5. Locate the CSM-11 Solenoid Control (item # 2) in the pilot system. Make sure proper voltage is supplied to the coil. Make sure the plunger style manual operator is not engaged. Rotate the plunger clockwise and push down at the same time to activate the manual operator feature. This simulates energization of the coil. The manual operator will lock in this position. Rotate the manual operator counter-clockwise and the spring load in the coil will return the plunger to its original or normal position.

6. This valve is held open by the static system pressure. To bleed the air from the main valve cover, power section, and pilot system turn the manual operator on the CSM-11 Solenoid Control (item # 2) as indicated in paragraph # 5 to close the valve. When the valve is completely closed bleed the air from the main valve cover by loosening packing gland nut on the X105 Micro Switch Assembly. (item # 4) Tighten packing gland nut after all air is removed. **Caution:** only loosen packing gland nut enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed. Return the manual operator on the CSM-11 Solenoid Control (item # 2) to its normal position and the valve will open. When the valve is completely open the air can be vented from the main valve power section by loosening the tubing nut by the closing speed control (item # 3B). Tighten tube nut after all air is vented. Always check the effect in the system before starting.

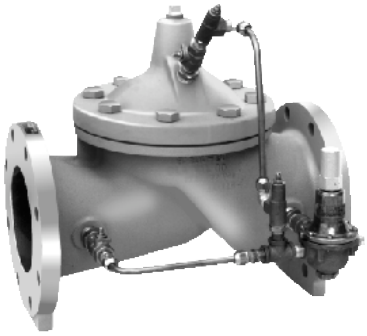
7. Start the pump to establish a flow through the valve. The CSM-11 solenoid (item # 2) must be electrically energized to close the valve. As the valve closes the collar on the actuating stem of the micro switch (item # 4) travels downward, away from the micro switch arm. This closes the micro switch and locks the pump starter circuit on line. Always check the effect in the system before starting.

8. Observe the closing rate of the valve and adjust the CV closing speed control (item # 3B) to prevent the pump starting surge from being transmitted into the system. Turning the adjustment clockwise decreases the valve opening speed. Turning the adjustment counter-clockwise increases the valve opening speed.

9. Engage the pump stopping sequence. The pump should continue to run and the CSM-11 solenoid (item# 2) should de-energize. This initiates the opening cycle of the valve. Observe the opening rate of the valve and adjust the CV opening speed control (item # 3A) to prevent the pump stopping surge from being transmitted into the system. Turning the adjustment clockwise decreases the opening rate. Turning the adjustment counter-clockwise increases the opening rate. As the valve opens the actuating stem collar moves toward the micro switch (item # 4) opening it and stopping the pump.

10. All valve adjustments are now set. Lockup all jam nuts to retain settings.

Refer to the valve schematic for location of pilot controls.



90-01/690-01
Pressure Reducing Valve

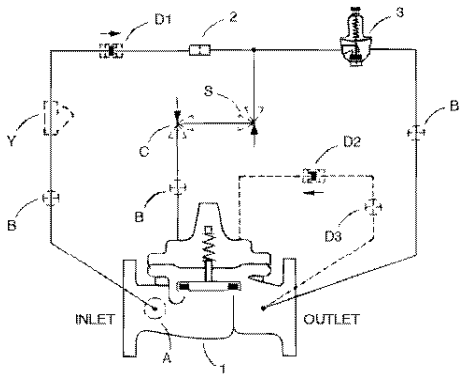
Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58 Restriction Fitting
3	CRD Pressure Reducing Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation valve
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.



1. Install pressure gauges at main valve inlet and outlet. Place gauges in unused body tappings. Downstream gauge can be installed in unused 3/8" CRD Pressure Reducing Control (item # 3) body tapping.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Observe the setting on the CRD Pressure Reducing Control (item #3). There is a tag attached to the pilot cover with the factory setting. If the pilot has a 15-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 30-300 PSI spring range has a 27 PSI change for each 360 degree turn in/out. Alter the factory setting (turn adjustment clockwise/counter-clockwise) until the set point of the control is close to the required setting. This setting is approximate and may have to be changed once the valve is pressurized. Actual pressure settings must be made under a flowing condition.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start. CV opening speed included as standard equipment on valves 3" and smaller.

6. Open inlet isolation valve slowly to pressurize main valve.

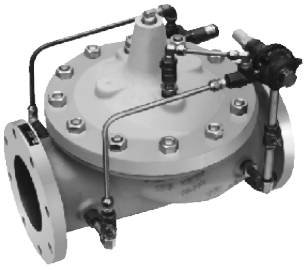
7. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open downstream isolation valve and establish a low flow in the system. Refer to minimum flow requirements for each valve size Always check the effect in the system before starting.

9. Slowly adjust the CRD Pressure Reducing Control (item # 3) observing the down stream pressure gauge until the desired pressure is achieved (clockwise to increase setting or counter-clockwise to decrease setting). Adjust CV flow controls until desired valve opening or closing speeds are obtained. Adjust opening rate so that valve opens slowly to desired outlet pressure and does not over shoot setting. Adjust closing rate so valve does not cause excessive system pressure surging upon closing.

10. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

Size	Minimum Flow (gpm)
1 1/4-1 1/2"	15
2"	15
2 1/2"	20
3"	30
4"	50
6"	115
8"	200
10"	300
12"	400
14"	500
16"	650
24"	1500



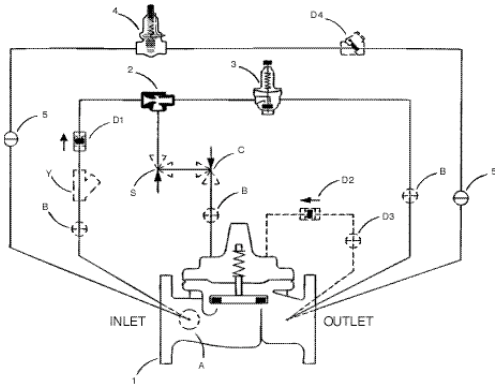
90-48/690-48
Pressure Reducing Valve with
Low Flow By-Pass

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X47A Ejector
3	CRD Pressure Reducing Control
4	CRD40 Pressure Reducing Control
5	CK2 Isolation Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation valve
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet/outlet. Place gauges in unused body tappings. Downstream gauge can be installed in unused 3/8" CRD40 Pressure Reducing Control (item # 3) body tapping.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Observe the settings on the CRD Pressure Reducing Control (3) and CRD40 (4). There is a tag attached to the pilot cover with the factory setting. If the CRD has a 15-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 30-300 PSI spring range has a 27 PSI change for each 360 degree turn in/out. You can alter the factory setting (turn adjustment clockwise/counter-clockwise) using this information until the set point of the control is close to the required setting. This setting is approximate and may have to be changed once the valve is pressurized. Actual pressure settings must be made under a flowing condition.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start. CV opening speed included as standard equipment on valves 3" and smaller.

6. Open inlet isolation valve slowly to pressurize main valve.

7. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open downstream isolation valve and establish a low flow in the system. Refer to minimum flow requirements for each valve size. Always check the effect in the system before starting.

9. Slowly adjust the CRD Pressure Reducing Control (3) observing the down stream pressure gauge until the desired pressure is achieved (clockwise to increase setting or counter-clockwise to decrease setting). Adjust CV flow controls until desired valve opening or closing speeds are obtained. Adjust opening rate so that valve opens slowly to desired outlet pressure and does not over shoot setting. Adjust closing rate so valve does not cause excessive system pressure surging upon closing.

10. Next adjust the CRD40 Pressure Reducing Control (4). This is the low flow bypass. This control must be set 5 PSI higher then the CRD Pressure Reducing Control (3). Use the CK2 isolation valves in the pilot system to isolate each pressure reducing pilot before attempting to adjust the control. The capacity of the low flow bypass is very small (4-5 gpm). So lower the system flow to with in these limits before setting the low flow bypass. Example: If the system pressure is to be maintained at 140 PSI set the low flow bypass CRD40 (4) at 140 PSI and set the CRD (3) at 135 PSI. Set CRD (3) first, then set CRD40 (4) second.

11. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

Size	Minimum Flow (gpm)
1 1/4-1 1/2"	15
2"	15
2 1/2"	20
3"	30
4"	50
6"	115
8"	200

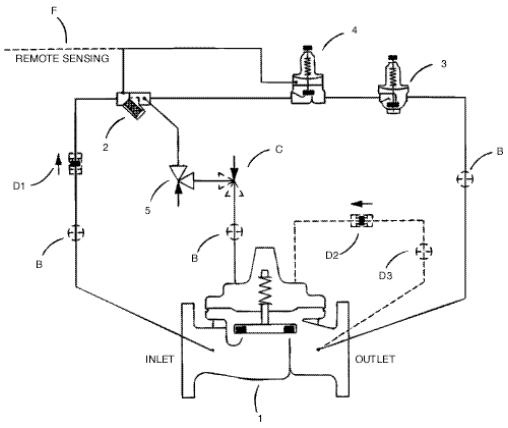
92-01/692-01 Combination Pressure Reducing Sustaining & Pressure Sustaining Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X44A Strainer & Orifice
3	CRD Pressure Reducing Control
4	CRL Pressure Relief Control
5	CV Flow Control (Opening)

Optional Features

Item	Description
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves With Isolation valve
F	Remote Pilot Sensing



1. Install pressure gauges upstream/downstream of valve. Place inlet gauge in unused main valve body inlet tapping. Downstream gauge can be placed in unused 3/8" CRD body tapping in pilot system.

2. Open all isolation valves in pilot system. Isolation valves included in pilot systems on 4" and larger valves standard (4 CK2 Isolation Valves Total). Remove all pilot caps and loosen all jam nuts.

3. Adjust CV Opening Speed Control (Item # 5). Turn adjusting screw clockwise until its all the way in. Back out adjustment 3 full turns to start.

4. Back out adjustment on the CRL Back pressure Control (Item # 4) all the way.

5. Observe setting on CRD Pressure Reducing Control (Item # 3). There is a tag attached to the pilot cover with the factory setting. You can change the pressure setting by using the following information. If the CRD has a 15-75 PSI spring range each 360 degree turn in or out changes the setting 9 PSI. The 30-300 PSI spring range has a 27 PSI change for each 360 degree turn in or out. You can approximate the downstream pressure by changing the factory setting using this information. Actual pressure settings must be made under a flowing condition.

6. Open inlet and outlet system isolation valves slowly to pressurize valve. Make sure downstream pressure stays within system limits.

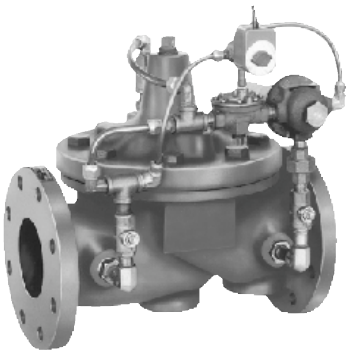
7. Bleed air from main valve cover and high points in pilot system. Tighten nut after all air is removed. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Establish a low flow in the system. Adjust CV Opening Speed Control clockwise to decrease ope n-ing rate and counter-clockwise to increase opening rate. A slow valve opening rate will prevent the pump start-ing surge from being transmitted into the system.

9. Adjust CRD Pressure Reducing Control to provide desired outlet pressure. A clockwise adjustment increases outlet pressure and a counter-clockwise adjustment decreases outlet pressure.

10. Establish the maximum flow rate for this system. Turn on the maximum number of sprinklers the pump is designed to handle. Then slowly adjust the CRL Back pressure Control clockwise until the outlet pressure drops off 3-5 PSI then stop. Next slowly turn CRL adjustment counter-clockwise until outlet pressure returns to normal. Then stop setting is complete.

11. All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps. Vary flow rates in system to make sure valve is set properly.



93-01/693-01
Pressure Reducing Valve &
Solenoid Shut-off

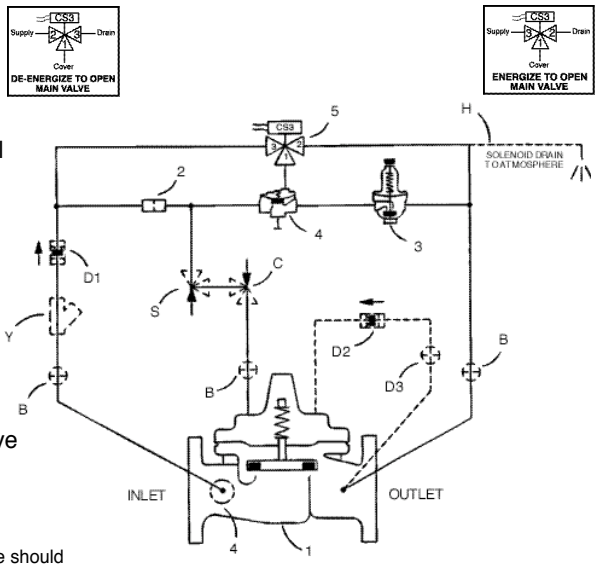
Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restriction Assembly
3	CRD Pressure Reducing Control
4	100-01 Hytrol (Reverse Flow)
5	CS3 Solenoid Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation valve
H	Solenoid Drain To Atmosphere
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.



4 – 4

1. Install pressure gauges at main valve inlet and outlet. Place gauges in unused body tappings. Downstream gauge can be installed in the unused 3/8" CRD Pressure Reducing Control (item # 3) body tapping.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger). Remove pilot caps and loosen all jam nuts.

4. Observe the setting on the CRD Pressure Reducing Control (item # 3). There is a tag attached to the pilot cover with the factory setting. If the pilot has a 15-75 PSI spring range each 360 degree turn in/out changes the setting 9 PSI. The 30-300 PSI spring range has a 27 PSI change for each 360 degree turn in/out. Alter the factory setting (turn adjustment clockwise/counter-clockwise) until the setpoint of the control is close to the required setting. This setting is approximate and should have to be changed once the valve is pressurized. Actual pressure settings must be made under a flowing condition.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start. CV opening speed included as standard equipment on valves 3" and smaller.

6. Locate the CS3 Solenoid Control (item # 5) in the pilot system. Make sure proper voltage is supplied to the coil. If the unit is equipped with a manual operator make sure it is backed all the way out counter-clockwise (rotating the red thumb screw clockwise simulates energization of the coil.) .Solenoid can be supplied energized to open main valve or de-energized to open main valve. You can determine the valve operation in two ways:

A. Energized to open main valve supply pressure comes to port # 3 on solenoid, port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item # 4), and po r t #2 is vented to atmosphere (catalog number suffix H. or to the downstream side of the valve standard. Also check the Asco Solenoid catalog number 8320G136 normally open.

B. De-energized to open main valve supply pressure comes to port # 2 on CS3 solenoid (item # 5), port # 1 is connected to the cover of the 3/8" auxiliary hytrol (item #4), and port # 3 is vented to atmosphere (catalog number suffix H) or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G132 normally closed.

7. Open inlet isolation valve slowly to pressurize main valve.

8. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

9. Open downstream isolation valve and establish a low flow in the system. To accomplish this the CS3 solenoid (item # 5) must be electrically energized to open the main valve under command of the CRD Pressure Reducing Control (item # 3) in valves so equipped. If the valve is de-energized to open no electrical power is required to open the main valve. In valves so equipped if the CS3 solenoid (item # 5) is energized the main valve closes. The porting sequence for the CS3 solenoid (energized to open or de-energized to open appears in the valve schematic) Refer to minimum flow requirements for each valve size. Always check the effect in the system before starting.

Size	Minimum Flow (gpm)
1 1/4-1 1/2"	15
2"	15
2 1/2"	20
3"	30
4"	50
6"	115
8"	200
10"	300
12"	400
14"	500
16"	650
24"	1500

10. Slowly adjust the CRD Pressure Reducing Control observing the down stream pressure gauge until the desired pressure is achieved (clockwise to incr e a s e setting or counter-clockwise to decrease setting) .Adjust CV flow controls until the desired valve opening or closing speeds are obtained. Adjust the opening rate so that valve opens slowly to the desired outlet pressure and does not over shoot the setting. Adjust closing rate so the valve does not cause excessive system pressure surging upon closing.

11.) All valve adjustments are now set. Lockup all jam nuts to retain settings. Replace all pilot caps.

12. To close the main valve on solenoids energized to open remove electrical power from the solenoid. This will connect ports 3 & 1 on the solenoid directing inlet pressure into the cover of the 3/8" auxiliary hytrol closing it. This will in turn direct inlet pressure into the cover of the main valve closing it.

To close the main valve on solenoids de-energized to open apply electrical power to the solenoid. This will connect ports 2 & 1 on the solenoid directing inlet pressure into the cover of the 3/8" auxiliary hytrol closing it. This will in turn direct inlet pressure into the cover of the main valve closing it.

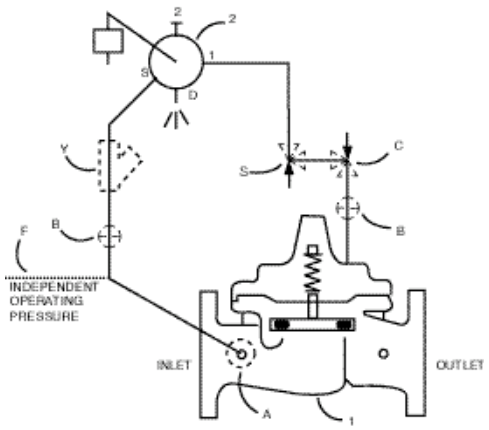
124-01/624-01 Float Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CF1-C1 Float Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
F	Independent Operating Pressure
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



Float Valve Start-up and Adjustment Instructions 124-01/624-01

1. Install pressure gauge at main valve inlet.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger).

4. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

5. Balance the CF1-C1 Float Control (item #2) by removing the float rod and float from the control. Remove the float from the float rod and leave on the stop collars. Reinstall the float rod on the CF1-C1 Float Control. Loosen set screw on counterweight and move weight in or out until float control is balanced. Tighten set screw. Push down on the float rod assembly and make sure the control returns to its balanced position. When balancing is achieved reinstall the float. Set the stop collars the required distance apart. Several different counterweights are available. Use counter weight:

P/N	Float Rod Length
V006903J (standard)	2 Feet
V6230G	3-6 Feet
V6231E	7-12 Feet

Do not exceed 12 feet of float rod.
A stilling well (8" minimum diameter) should be provided for the float to minimize the effects of turbulence, ripples or wind.

6. Open inlet isolation valve slowly to establish flow through main valve. Most float valve applications only have one inlet isolation valve because they discharge directly to atmosphere.

7. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover. Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. All valve adjustments are now set. Lockup all jam nuts to retain settings.

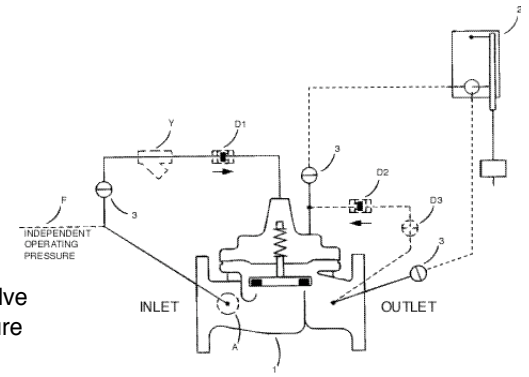
428-01/628-01
Modulating Float Valve

Schematic Diagram

Item	Description
1	Hytrol Main Valve
2	CFM-9 Float Control
3	CK2 Isolation Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
D	Check Valves with Isolation valve
F	Independent Operating Pressure
Y	X43 “Y" Strainer



1. 428-01 main valve should be installed in a horizontal pipe, cover up. Install pressure gauge at main valve inlet.

2. The CFM-9 Float Control must be installed in an accessible location at any elevation above the valve providing that the amount of flowing line pressure in PSI is equal to or greater then the vertical distance in feet between the valve and the float control.

3. The float control discharge must be piped back to the main valve outlet port. Both lines connecting the valve and the float control (not supplied by Cla-Val) must be large enough to minimize pressure drop under maximum flow conditions. Use 3/4" I.D. pipe up to 20 feet and 1" pipe to 30 feet. Do not exceed 30 feet in any one run of pipe and try to minimize the number of elbows used.

4. Install pressure gauge at main valve inlet.

5. Open all isolation CK2 valves in pilot system (valves 4" and larger).

6. Balance the CFM-9 Float Control (item #2) by removing the float rod and float from the control. Remove the float from the float rod and leave on the stop collars. Reinstall the float rod on the CFM-9 Float Control. Loosen set screw on counterweight and move weight in or out until float control is balanced. Tighten set screw. Push down on the float rod assembly and make sure the control returns to its balanced position. When balancing is achieved reinstall the float. For best performance, lock the stop collars on either side of the float. Several different counter-weights are available. Use counter weight:

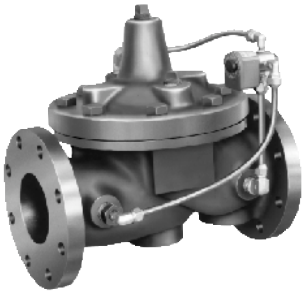
P/N	Float Rod Length
V006903J (standard)	2 Feet
V6230G	3-6 Feet
V6231E	7-12 Feet

Do not exceed 12 feet of float rod. A stilling well (8" minimum diameter) should be provided for the float to minimize the effects of turbulence, ripples or wind.

7. Open inlet isolation valve slowly to establish flow through main valve. Most float valve applications only have one inlet isolation valve because they discharge directly to atmosphere.

8. Bleed air from main valve cover by loosening tube nut on the pilot control line from main valve inlet. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

9. All valve adjustments are now set.



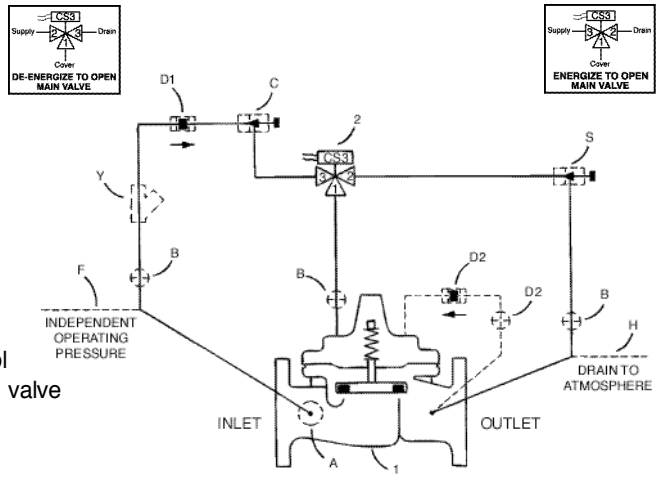
136-01/636-01
Solenoid Control Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CS3 Solenoid Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CNA Closing Speed Control
D	Check Valves with Isolation valve
S	CNA Needle Valve
Y	X43 "Y" Strainer



Solenoid Control Valve Start-up and Adjustment Instructions 136-01/636-01

1. Install pressure gauges at main valve inlet/outlet using main valve body tappings.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger).

5. Adjust CNA speed controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

6. Locate the CS3 Solenoid Control (item # 2) in the pilot system. Make sure proper voltage is supplied to the coil. If the unit is equipped with a manual operator make sure it is backed all the way out counter-clockwise (rotating the red thumb screw clockwise simulates energization of the coil). Solenoid can be supplied energized to open main valve or de-energized to open main valve. You can determine the valve operation in two ways:
A. Energized to open main valve supply pressure comes to port # 3 on solenoid, port # 1 is connected to the cover of the main valve (item #1), and port # 2 is vented to atmosphere (catalog number Suffix "H") or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G136 normally open.
B. De-energized to open main valve supply pressure comes to port # 2 on CS3 solenoid (item # 2), port # 1 is connected to the cover of the main valve (item # 1), and port # 3 is vented to atmosphere (catalog number Suffix "H") or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G132 normally closed.

7. Open inlet isolation valve slowly to pressurize the main valve.

8. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installations to valves 6" and smaller). Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

9. Open downstream isolation valve and establish a flow in the system. To accomplish this the CS3 solenoid (item # 2) must be electrically energized to open the main valve in valves so equipped. If the valve is de-energized to open no electrical power is required to open the main valve. In valves so equipped if the CS3 solenoid (item # 2) is energized the main valve closes. The porting sequence for the CS3 solenoid (energized to open or de-energized to open appears in the valve schematic) Always check the effect in the system before starting.

10. Adjust CNA speed controls until the desired valve opening or closing speeds are obtained. Adjust the opening rate so that valve opens slowly (Turning counter-clockwise increases valve opening speed/ Turning clockwise decreases valve opening speed). Adjust closing rate so the valve does not cause excessive system pressure surging upon closing (Turning counter-clockwise increases valve closing rate and turning clockwise decreases valve closing rate).

11. All valve adjustments are now set. Lockup all jam nuts to retain settings.

12. To close the main valve on solenoids energized to open remove electrical power from the solenoid. This will connect ports 3 & 1 on the solenoid directing inlet pressure into the cover of the main valve closing it. To close the main valve on solenoids de-energized to open apply electrical power to the solenoid. This will connect ports 2 & 1 on the solenoid directing inlet pressure into the cover of the main valve closing it.

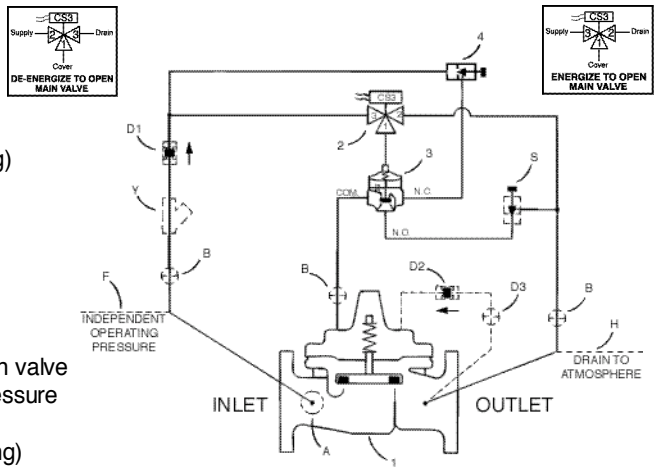
136-03/636-03 Solenoid Control Valve

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CS3 Solenoid Control
3	102C-3HThree-Way Valve
4	CNA Needle Valve (Closing)

Optional Features

Item	Description
A	X46 Flow Clean Strainer
B	CK2 Isolation Valve
D	Check Valves With Isolation valve
F	Independent Operating Pressure
H	Atmospheric Drain
S	CNA Needle Valve (Opening)
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet/outlet using main valve body tappings.

2. Install X101 Valve Position Indicator in center cover tapping of main valve (if available).

3. Open all isolation valves in pilot system (valves 4" and larger).

5. Adjust CNA speed controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start.

6. Locate the CS3 Solenoid Control (item #2) in the pilot system. Make sure proper voltage is supplied to the coil. If the unit is equipped with a manual operator make sure it is backed all the way out counter-clockwise (Rotating the red thumb screw clockwise simulates energization of the coil). Solenoid can be supplied energized to open main valve or de-energized to open main valve. You can determine the valve operation in two ways:
A. Energized to open main valve supply pressure comes to port # 3 on solenoid, port # 1 is connected to the cover of the 1/2" 102C-3H three way valve (item # 3), and port # 2 is vented to atmosphere (catalog number Suffix "H") or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G136 normally open.
B. De-energized to open main valve supply pressure comes to port # 2 on CS3 solenoid (item # 2), port # 1 is connected to the cover of the 1/2" 102C-3H three way valve (item # 3), and port # 3 is vented to atmosphere (catalog number Suffix "H") or to the downstream side of the valve standard. Also check the ASCO Solenoid catalog number 8320G132 normally closed.

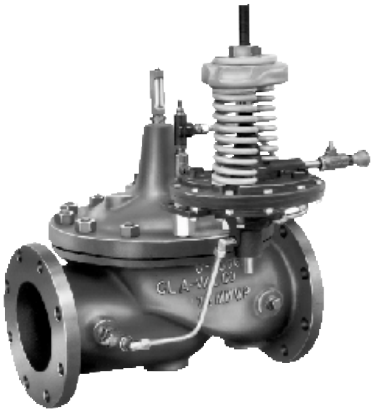
7. Open inlet isolation valve slowly to pressurize the main valve.

8. Bleed air from main valve cover by loosening pipe plug in center of main valve cover or X101 Valve position Indicator housing. If valve is installed in a vertical line it will be necessary to loosen the cover bolts between 10 o'clock and 2 o'clock to vent air from main valve cover (Limit vertical installations to valves 6" and smaller). Tighten pipe plug or cover bolts after all air is removed. **Caution:** only loosen pipe plug or cover bolts enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

9. Open downstream isolation valve and establish a flow in the system. To accomplish this the CS3 solenoid (item # 2) must be electrically energized to open the main valve in valves so equipped. If the valve is de-energized to open no electrical power is required to open the main valve. In valves so equipped if the CS3 solenoid (item # 2) is energized the main valve closes. The porting sequence for the CS3 solenoid (energized to open or de-energized to open appears in the valve schematic) Always check the effect in the system before starting.

10. Adjust CNA speed controls until the desired valve opening or closing speeds are obtained. Adjust the opening rate so that valve opens slowly (Turning counter-clockwise increases valve opening speed/ Turning clockwise decreases valve opening speed). Adjust closing rate so the valve does not cause excessive system pressure surging upon closing (Turning counter-clockwise increases valve closing rate and turning clockwise decreases valve closing rate).
11. All valve adjustments are now set. Lockup all jam nuts to retain settings.

12. To close the main valve on solenoids energized to open remove electrical power from the solenoid. This will connect ports 3 & 1 on the solenoid directing inlet pressure into the cover of the main valve closing it. To close the main valve on solenoids de-energized to open apply electrical power to the solenoid. This will connect ports 2 & 1 on the solenoid directing inlet pressure into the cover of the main valve closing it.



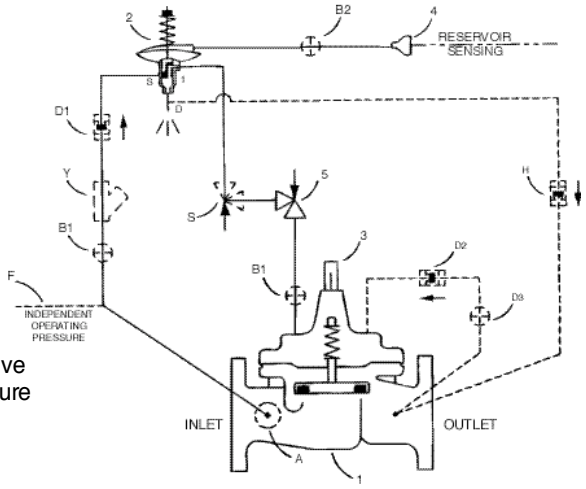
210-01/610-01 Altitude Valve for One-Way Flow

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CDS6 Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	CV Flow Control (Closing)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
D	Check Valve with Isolation valve
F	Independent Operating Pressure
H	Dry Drain
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



1. Install pressure gauges at main valve inlet and outlet using the inlet /outlet body tappings on the main valve.

2. The CDS6 Altitude Control (item # 2) sensing line (not supplied by Cla-Val) should run from the pilot control directly to the storage tank. This way the pilot control senses the static height of the liquid in the tank directly. Accurate and consistent valve performance is achieved with this approach.

3. Open all isolation valves in pilot system (valves 4" and larger) and loosen all pilot control jam nuts.

4. Observe the adjustment on the CDS6 Altitude Control (item #2). There is a tag attached to the pilot with the factory setting. There are 5 spring ranges available with this pilot control:

Springs	Range
1	5-40 Feet
2	30-80 Feet
3	70-120 Feet
4	110-160 Feet
5	150-200 Feet

Using this information you can change the factory setting to approximate the shut-off height of the valve. This setting is not exact and may have to be corrected under actual conditions.

5. Adjust CV flow controls (opening/closing speeds) if included in pilot system. Turn control clockwise until closed then back out three turns to start. CV closing speed included as standard equipment on all altitude valves.

6. Open inlet isolation valve slowly to pressurize main valve.

7. Bleed air from main valve cover by loosening pipe plug in center of X101 Valve Position Indicator housing (standard on all altitude valves). Tighten pipe plug after all air is removed. **Caution:** only loosen pipe plug enough to allow the air trapped in the cover to escape. Loosen tubing nuts in high points in pilot system to remove air from the pilot control system. Tighten tube nuts after all air is removed.

8. Open downstream isolation valve and establish a flow to the tank (Always check the effect in the system before starting). It may be necessary to increase the setting on the CDS6 Altitude Control to allow the valve to open. The water in the cover of the valve will discharge to atmosphere through the altitude control (unless supplied with dry drain feature Suffix "H"). The volume of water will depend on the valve size: Make provision for

this discharge to be handled safely.

Size	Cover Capacity
2"	.032
2 1/2"	.042
3"	.080
4"	.169
6"	.513
8"	1.26
10"	2.51
12"	4.0
14"	6.50
16"	9.57
24"	29.0

9. As the water level rises to the shutoff point in the tank slowly adjust the CDS6 Altitude Control (item # 2) until the valve starts to close when the desired level is achieved (clockwise to increase water level or counter-clockwise to decrease water level). Adjust CV flow controls until desired valve opening or closing speeds are obtained. Adjust opening rate so that valve opens slowly (turn clockwise to decrease valve opening rate and counter-clockwise to increase valve opening rate). Adjust closing rate so valve does not cause excessive system pressure surging upon closing (Turn clockwise to decrease valve closing rate and counter-clockwise to increase valve closing rate).

10. All valve adjustments are now set. Lockup all jam nuts to retain settings.